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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/014,766	12/11/2001	Christos Dimitrios Dimitrakopoulos	YOR920010283US2	9469

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EXAMINER	
KIELIN, ERIK J	

ART UNIT	PAPER NUMBER
2813	6

DATE MAILED: 01/09/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/014,766	Applicant(s) DIMITRAKOPOULOS ET AL.	
	Examiner Erik Kielin	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 23 December 2002 .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-9 is/are pending in the application.

4a) Of the above claim(s) 6-9 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-5 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2,3 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

This action responds to the IDS submitted 11 December 2001 (Paper No. 2) the supplemental IDS submitted 27 February 2002 (Paper No. 3) and the response to the restriction requirement submitted 23 December 2002 (Paper No. 5).

Election/Restrictions

1. Applicant's election of the invention of Group I, claims 1-5 in Paper No. 5 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

2. Claims 6-9 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Drawings

3. Figures 1 and 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). (See specification p. 3, lines 3-5.)

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

4. Claims 4 and 5 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Regarding claim 4 provides a Markush group wherein the perylene compound is perylene 3,4,9,10-tetracarboxylic acid diimide, but claim 3, from which claim 4 depends requires further limitations of the perylene compound.

Regarding claim 5, "the improvement of Claim 4 wherein said N,N"-di(n-octyl)alkyl perylene 3,4,9,10-tetracarboxylic acid diimide is N,N'-di(n-1H, 1 H-perfluorooctyl) perylene 3A9, 10- tetracarboxylic acid diimide" does not further limit the claim since it depends from claim 4, and neither claim 4 nor claim 5, as presently written require the compound to be the n-octyl perylene or the 1H, 1H-perfluorooctyl form of perylene. Rather the claim 5, merely limits the n-octyl structure of the Markush group.

Claim Rejections - 35 USC § 102/103

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 1-5 are rejected under 35 U.S.C. 102(a) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over the article Struijk et al. "Liquid Crystalline Perylene Diimides: Architecture and Charge Carrier Mobilities" Journal of the American Chemical Society 2000, 122, pp. 11057-11066 (article provided by Applicant).

Regarding claim 1, Struijk discloses an organic thin film semiconductor device wherein there is an n-channel having contacts separated by said n-channel, the improvement wherein said organic thin film is of a perylene tetracarboxylic acid diimide compound. (See Fig. 1, p. 11058; paragraph bridging pp. 11065 and 11066; last paragraph of left-hand col. of p. 11066.) Note in pertinent part that n-channel character of the parylene compound is indicated and that the use is contemplated for FET (field effect transistors) which inherently have a channel separated by electrodes contacting the organic semiconductor layer.

Although Struijk does not indicate if the interface between said contacts and the parylene compound thin film is not treated, this limitation is not considered to have patentable weight. Note that a "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See also *In re Brown*, 173 USPQ 685; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); *In re Marosi et al*, 218 USPQ 289; and particularly *In re Thorpe*, 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a

new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law make clear. (See MPEP 2113.)

Regarding claim 2, perylene 3,4,9,10-tetracarboxylic acid diimide structure is shown in Fig. 1, as noted above.

Regarding claim 3, the substituents attached to imide nitrogens in said diimide structure comprise at least one of atom chains taken from the group of, linear alkyl chains, branched alkyl chains, electron deficient alkyl groups, electron deficient benzyl groups, chains having a length of four to eighteen atoms, and chains having a length of eight atoms, as shown in Fig. 1.

Regarding claim 4, the compound is taken from the group of, a perylene 3,4,9,10-tetracarboxylic acid diimide, heterocyclic variations of said 3,4,9, 10 perylene tetracarboxylic acid diimide, N,N"-dialkyl perylene 3,4,9,10-tetracarboxylic acid diimide in which alkyl chain length is from four to eighteen carbon atoms, and, N,N"-di(n-octyl)alkyl perylene-3,4,9,10-tetracarboxylic acid diimide.

Regarding claim 5, "the improvement of Claim 4 wherein said N,N"-di(n-octyl)alkyl perylene 3,4,9,10-tetracarboxylic acid diimide is N,N"-di(n-1H, 1 H-perfluorooctyl) perylene 3,4,9,10- tetracarboxylic acid diimide" does not further limit the claim since it depends from claim 4, and neither claim 4 nor claim 5, as presently written require the compound to be the n-octyl perylene or the 1H, 1H-perfluorooctyl form of perylene. Rather the claim 5, merely limits the n-octyl structure of the Markush group. Accordingly, because claim 4 is anticipated or obvious over **Struijk**, so is claim 5.

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Struijk** in view of US 6,387,727 B1 (**Katz** et al.).

The prior art of **Struijk**, as explained above, discloses each of the claimed features. If it is thought, however, that claim 5 is somehow limits the perylene compound to only the N,N''-di(n-1H, 1 H-perfluorooctyl) perylene 3,4,9,10- tetracarboxylic acid diimide, then this is not expressly taught by **Struijk**.

Katz also teaches a thin film transistor (cover Fig.) wherein the n-channel organic semiconductor **20** compounds are "formed from fused-ring tetracarboxylic diimide[s]" (Abstract). Source/drain electrodes **10** and **12** are also shown in contact with **20**. **Katz** indicates that "[u]seful chains having such fluoro substituents include **1H,1H-perflurooctyl**" attached to the imide nitrogen. (Emphasis added.) **Katz** indicates that such fluoro groups are typically and beneficially used to fill in the space of the crystal lattice of the organic semiconductor film of the transistor to prevent oxygen permeability. (See col. 5, lines 29-65.)

It would have been obvious for one of ordinary skill in the art, at the time of the invention to modify the imide substituent of the perylene compound of **Struijk** to use the 1H,1H-perflurooctyl group, in order to beneficially reduce the oxygen permeability into the perylene semiconductor film of the transistor, as taught by **Katz**.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US 4,611,385 (**Forrest** et al.) discloses the claimed perylene compound of at least claims 1-4 (col. 3, lines 10-20) and that the compound may be used in a field effect transistor (col. 8, lines 31-43).

US 6,278,127 B1 (**Dodabalapur** et al.; col. 3, lines 46-64; cover Fig.) and US 6,326,640 B1 (**Shi** et al.; Abstract; cover Figs.; sentence bridging cols. 2-3) each teach the use of perylene compounds as the n-channel of transistors.

US 5,405,724 and US 5,449,582 (each to **Hsieh** et al.) teach the use of the claimed perylene compound of claims 1-4 and that the compound may be used in a thin film transistor. (See col. 1, first paragraph; col. 7, last paragraph; and Fig. 9 of each.)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Erik Kielin whose telephone number is 703-306-5980. The examiner can normally be reached on 9:00 - 19:30 on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl Whitehead, Jr., can be reached at 703-308-4940. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Erik Kielin
January 7, 2003